

1 **WHAT IS CLAIMED IS:**

2 1. A method for detecting objects and ranging used by vehicle backing system,
3 which includes:

4 presetting "n" number of threshold values in memory, each based on a specific
5 distance;

6 sampling "n" times on an echoed signal;

7 saving "n" number of sampled signal values in memory;

8 comparing each sampled signal with the respective threshold value, if the value
9 of the newly sampled data is greater, that means an object is present in the detection
10 range, so distance computation can be initiated; and the current sample value is further
11 compared with the control data (i.e. previous sample value); if the current sample value
12 is not equal to the previous sample value, then the current sample data is saved to replace
13 the previous control data; but if two are equal or close to each other, the current sample
14 value is only used for distance computation without updating the control data.

15 2. A method for detecting objects and ranging used by vehicle backing system as
16 claimed in claim 1, whereby when any sampled signal is notably above the
17 corresponding threshold value, that means an object is present, distance computation can
18 be initiated, since the threshold value represents a predetermined distance value.

19 3. A method for detecting objects and ranging used by vehicle backing system as
20 claimed in claim 1, whereby when one of the sampled data is notably above the previous
21 sample, that means an object is present, distance computation can be initiated.

22 4. An apparatus for detecting objects and ranging used by vehicle backing
23 system as claimed in claim 2, wherein the sensor array is made up of one or more signal
24 sensors or transceivers.

1 5. An apparatus for detecting objects and ranging used by vehicle backing
2 system as claimed in claim 3, wherein the sensor array comprises one or more signal
3 sensors or transceivers.

4 6. A method for detecting objects and ranging used by vehicle backing system as
5 claimed in claim 4, whereby, if one or more object is detected, the sensor recording the
6 smallest distance value is regarded as the actual distance from the nearest object.

7 7. A method for detecting objects and ranging used by vehicle backing system as
8 claimed in claim 5, whereby, if one or more object is detected, the alarm warning is
9 issued with a frequency set to correspond to the relative distance.

10 8. A method for detecting objects and ranging used by vehicle backing system as
11 claimed in claim 6, wherein, if an object is detected, the alarm warning is issued with a
12 frequency set to correspond to the relative distance.

13 9. An apparatus for object detection and ranging used by vehicle backing system,
14 which includes:

15 a processor, which is connected to an alarm and a memory device, and is used
16 for detecting objects and issuing a warning when there is obstruction;

17 a channel selector, which is controlled by the processor and is used to select the
18 active sensor;

19 multiple power boosters, which are connected between the channel selector and
20 the sensors in the sensor array for controlling the signal transmission by the above
21 sensors; and

22 an A/D converter, which is connected between the channel selector and the
23 processor, and is used to convert the received signal to a digital format for computation
24 of relative distance;

1 whereby, the processor through the channel selector governs the sequence of
2 transmission of a ranging signal by one of the sensors in accordance with a given
3 sequence, and later the reception of echoed signals, by the same sequence, which are
4 then converted by the A/D converter to a digital format for computation of relative
5 distance.

6 10. An apparatus for object detection and ranging used by vehicle backing
7 system as claimed in claim 9, wherein the A/D converter is connected through a signal
8 amplifier to the channel selector, and then further connected to the sensor array; whereby
9 the signal received from the sensor array is amplified and passed to the comparator in the
10 A/D converter circuit.

11 11. An apparatus for object detection and ranging used by vehicle backing
12 system as claimed in claim 9, wherein a latch is used to connect the I/O pins of the
13 processor and the address pins of the memory device.

14 12. An apparatus for object detection and ranging used by vehicle backing
15 system as claimed in claim 9, wherein the A/D converter includes:

16 a voltage doubling circuit whose inputs are respectively connected to the
17 processor; and

18 a comparator where one input is connected to the output of the signal amplifier,
19 the other input is connected to the output of the voltage doubling circuit, and the output is
20 connected to the processor.

21 13. An apparatus for object detection and ranging used by vehicle backing
22 system as claimed in claim 12, wherein the signal amplifier is formed from multiple
23 cascaded operational amplifiers.

24 14. An apparatus for object detection and ranging used by vehicle backing

1 system as claimed in claim 13, wherein the output from the first-stage operational
2 amplifier in the signal amplification circuit is connected in series with a noise shielding
3 circuit.

4 15. An apparatus for object detection and ranging used by vehicle backing
5 system as claimed in claim 9, wherein the alarm is implemented by a buzzer.